

In re Patent Application of:

**CHAPPAZ**

Serial No. **09/855,734**

Filing Date: **MAY 15, 2001**

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**REMARKS**

Applicant would like to thank the Examiner for the thorough examination of the present application, and for correctly indicating as allowable the subject matter of dependent Claims 13, 20, 27 and 34. The arguments supporting patentability of the claims are presented in detail below.

**I. The Claims Are Patentable**

The Examiner rejected independent Claims 11, 18, 25 and 32 over the Ramesh et al. patent. The present invention, as recited in independent Claim 11, for example, is directed to a process for estimating an impulse response of a transmission channel defined by a sender, a receiver, and means of propagation extending therebetween.

The process comprises calculating a first estimate of the impulse response of the transmission channel considered as a whole. The first estimate is corrected independently of information being transmitted based upon an impulse response of the sender and an impulse response of the receiver that is known. This is done to obtain a corrected final estimate of the impulse response of the transmission channel. The process in accordance with the present invention may advantageously provide an improvement to channel estimation which can be applied equally well to learned estimates (i.e., those with training sequences) and blind estimates (i.e., those with no training sequences).

Independent method Claim 18 is similar to independent method Claim 11, but further recites that correcting the first estimate comprises calculating coefficients of the corrected final estimate by multiplying

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coefficients of the first estimate by a matrix whose coefficients are predetermined and representative of the impulse responses of the sender and of the receiver.

Independent device Claim 25 is directed to a receiver comprising first and second estimation circuits for performing the process as defined in independent method Claim 11. Independent Claim 32 is directed to a computer-readable medium for performing the process as defined in independent method Claim 11.

Referring now to the Ramesh et al. patent, a method for estimating an impulse response of a transmission channel is disclosed. As illustrated in FIG. 1, the transmission channel **40** is formed to include the communication channel **16** along with the filters **26** and **34**. The method includes dividing the intersymbol interference into channel introduced component portions and filter-induced component portions (column 6, lines 14-16). In particular, the Examiner makes reference to the equation in column 7, line 56, which is the channel impulse response of a signal received by the receiver.

The Applicant respectfully submits that the Examiner has mischaracterized Ramesh et al. More particularly, in the two embodiments illustrated in FIGS. 2 and 3 of Ramesh et al., it is not possible to distinguish an estimation followed by an improvement of the impulse response between the output of the sampler **56** and the output of the comparator **74**. Instead, Ramesh et al. performs several correlations between the sample signal and several reference vectors (coefficient  $C_k$ ).

In Ramesh et al., an estimation of the impulse response using the known transmission/reception elements is directly obtained, i.e., within a single step. The Examiner

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references column 8, lines 23-27 and FIG. 2 in Ramesh et al., but this still fails to disclose the claimed invention.

Reference is directed to column 8, lines 11-17 of Ramesh et al., which provides:

"In the Embodiment of FIG. 2, the sampling position at which an optimal correlation is detected is chosen, and the corresponding value of  $a$  is determined from the correlation.

In the embodiment illustrated in FIG. 3, oversampling is not utilized. Instead, a receive signal is sampled at a rate of one sample per symbol. In this embodiment, the memory elements **88-1** through **88-n** store multiple models of  $C_k$ ."

The result of the correlations made with the several versions of coefficient  $C_k$  which are stored in the elements **88-1** through **88-n** permits determination of both optimal sampling position and the values of the channel coefficients  $a_0$  and  $a_1$ . Once these coefficients are known, the search impulse response is obtained by a combination with the selected version of coefficient  $C_k$ . In other words, the optimal impulse response is directly obtained. The Applicant submits that Ramesh et al. fails to distinguish the following two steps, i.e., a calculation of a first estimate of the impulse response of the transmission channel as a whole, and a correction of the first estimate independently of the information being transmitted, as recited in independent Claim 11.

Further, as explained above, Ramesh et al. fails to disclose a correction of the first estimate independently of information being transmitted. On the contrary, in both of the

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disclosed embodiments, Ramesh et al. needs to compulsorily know several pilots or synchronization symbols. Ramesh et al. discloses that the stored data words are representative of the synchronization symbols.

Therefore, the Applicant submits that independent Claim 11 is patentable over the Ramesh et al. patent. Independent Claims 18, 25 and 32 are similar to independent Claim 11, and it is also submitted that these claims are patentable over the Ramesh et al. patent. In view of the patentability of the independent claims as discussed above, it is submitted that their dependent claims, which recite yet further distinguishing features, are also patentable over the prior art. Thus, these dependent claims require no further discussion herein.

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**CONCLUSION**

In view of the arguments provided herein, it is submitted that all the claims are patentable. Accordingly, a Notice of Allowance is requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,



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**CERTIFICATE OF MAILING**

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